

Amendments to the Claims

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Previously Presented) A modification method of the surface layer of a molded resin article which comprises the steps of:
 - placing, in a closed space, an organic compound having sublimation properties and an affinity for a resin of a molded resin article to be coated, and the molded resin article;
 - bringing the closed space to a saturated sublimation pressure state of the organic compound;
 - uniformly depositing a vapor of the organic compound on the surface of the molded resin article; and
 - allowing the deposited organic compound to penetrate/disperse from the surface of the molded resin article into its inside.
2. (Canceled)
3. (Original) The modification method of the surface layer of the molded resin article according to claim 1 wherein:
 - the organic compound is deposited on or contained in a sublimation source substrate in at least one manner selected from the group consisting of the following five manners (A) to (E) so that the organic compound can be deposited on the surface of the molded resin article:
 - (A) the organic compound being singly applied onto the surface of the sublimation source substrate, or formed into a film on the surface;
 - (B) the organic compound and a binder resin being applied onto the surface of the sublimation source substrate, or formed into a film on the surface;

(C) a porous particle impregnated with the organic compound being applied onto the surface of the sublimation source substrate, or formed into a film on the surface;

(D) the porous particle impregnated with the organic compound and the binder resin being applied onto the surface of the sublimation source substrate, or formed into a film on the surface; and

(E) a hole in the surface of a porous sublimation source substrate being impregnated with the organic compound.

4. (Original) The modification method of the resin surface layer according to claim 3 wherein:

the surface of the sublimation source substrate, on or in which the organic compound is deposited or contained in any one manner of said manners (A) to (E), is disposed in the vicinity of the surface of the molded resin article.

5. (Original) The modification method of the resin surface layer according to claim 1 which comprises the steps of:

placing the molded resin article and the organic compound in a vacuum container;

exhausting air through a vacuum valve disposed in the vacuum container to reduce the pressure in the vacuum container to a saturated sublimation pressure of the organic compound at a temperature which is equal to or higher than room temperature and which does not exceed a thermal decomposition temperature of the organic compound and/or the resin;

tightly closing all the vacuum valves disposed in the vacuum container to form a closed space;

raising the temperature in the tightly closed vacuum container up to a temperature at which a partial pressure of the organic compound reaches the saturated sublimation pressure in the reduced pressure state; and

after the heating for a predetermined time, slowly cooling the vacuum container.

6. (Original) The modification method of the resin surface layer according to claim 3 which comprises the steps of:

placing, in a vacuum container, the organic compound deposited on or contained in the sublimation source substrate in any one manner of the manners according to claim 3, and the molded resin article;

exhausting air through a vacuum valve disposed in the vacuum container to reduce the pressure in the vacuum container to a saturated sublimation pressure of the organic compound at a temperature which is equal to or higher than room temperature and which does not exceed a thermal decomposition temperature of the organic compound and/or the resin;

tightly closing all the vacuum valves disposed in the vacuum container to form a closed space;

raising the temperature in the tightly closed vacuum container up to a temperature at which a partial pressure of the organic compound reaches the saturated sublimation pressure in the reduced pressure state; and

after the heating for a predetermined time, slowly cooling the vacuum container.

7. (Original) The modification method of the resin surface layer according to claim 4 which comprises the steps of:

placing, in a vacuum container, the organic compound deposited on or contained in the sublimation source substrate in any one manner of the manners according to claim 3, and the molded resin article;

exhausting air through a vacuum valve disposed in the vacuum container to reduce the pressure in the vacuum container to a saturated sublimation pressure of the organic

compound at a temperature which is equal to or higher than room temperature and which does not exceed a thermal decomposition temperature of the organic compound and/or the resin;

tightly closing all the vacuum valves disposed in the vacuum container to form a closed space;

raising the temperature in the tightly closed vacuum container up to a temperature at which a partial pressure of the organic compound reaches the saturated sublimation pressure in the reduced pressure state; and

after the heating for a predetermined time, slowly cooling the vacuum container.

8. (Original) The modification method of the resin surface layer according to claim 1 which comprises the steps of:

placing the molded resin article and the organic compound in a vacuum container;

raising the temperature in the vacuum container up to a temperature which is equal to or higher than room temperature and which does not exceed a thermal decomposition temperature of the organic compound and/or the resin;

while keeping the above temperature, exhausting air through a vacuum valve disposed in the vacuum container to reduce the pressure in the vacuum container to a saturated sublimation pressure of the organic compound at the above temperature;

tightly closing all the vacuum valves disposed in the vacuum container to form a closed space; and

after the heating and the pressure reduction for a predetermined time, slowly cooling the vacuum container.

9. (Original) The modification method of the resin surface layer according to claim 3 which comprises the steps of:

placing, in a vacuum container, the organic compound deposited on or contained in the sublimation source substrate in any one manner of the manners according to claim 3, and the molded resin article;

raising the temperature in the vacuum container up to a temperature which is equal to or higher than room temperature and which does not exceed a thermal decomposition temperature of the organic compound and/or the resin;

while keeping the above temperature, exhausting air through a vacuum valve disposed in the vacuum container to reduce the pressure in the vacuum container to a saturated sublimation pressure of the organic compound at the above temperature;

tightly closing all the vacuum valves disposed in the vacuum container to form a closed space; and

after the heating and the pressure reduction for a predetermined time, slowly cooling the vacuum container.

10. (Original) The modification method of the resin surface layer according to claim 4 which comprises the steps of:

placing, in a vacuum container, the organic compound deposited on or contained in the sublimation source substrate in any one manner of the manners according to claim 3, and the molded resin article;

raising the temperature in the vacuum container up to a temperature which is equal to or higher than room temperature and which does not exceed a thermal decomposition temperature of the organic compound and/or the resin;

while keeping the above temperature, exhausting air through a vacuum valve disposed in the vacuum container to reduce the pressure in the vacuum container to a saturated sublimation pressure of the organic compound at the above temperature;

tightly closing all the vacuum valves disposed in the vacuum container to form a closed space; and

after the heating and the pressure reduction for a predetermined time, slowly cooling the vacuum container.

11-12. (Canceled)

13. (Previously Presented) The modification method of the resin surface layer according to claim 5 wherein:

the vapor of the organic compound is uniformly deposited on the surface of the molded resin article; and

in order to allow the deposited organic compound to penetrate/disperse from the surface of the molded resin article into its inside,

the temperature of the molded resin article is raised up to a temperature which is equal to or higher than a glass transition temperature of the resin and which does not exceed the thermal decomposition temperature of the organic compound and/or the resin.

14. (Previously Presented) The modification method of the resin surface layer according to claim 1 wherein:

a dyestuff having the sublimation properties and the affinity for the resin of the molded resin article to be coated is used as the organic compound to modify and simultaneously color the surface layer of the molded resin article.

15. (Original) The modification method of the resin surface layer according to claim 13 wherein:

a dyestuff having the sublimation properties and the affinity for the resin of the molded resin article to be coated is used as the organic compound to modify and simultaneously color the surface layer of the molded resin article.

16. (Canceled)

17. (Previously Presented) A modification apparatus for the surface layer of a resin which comprises:

a tightly closable container for placing an organic compound having sublimation properties and an affinity for a resin of a molded resin article to be coated, and the molded resin article in a saturated sublimation pressure state of the organic compound;

an exhaust system for adjusting a pressure in the tightly closable container; and

heating means for allowing the organic compound to penetrate/disperse into the molded resin article, after the organic compound sublimates and a vapor of the organic compound is deposited on the surface of the molded resin article; and

a sublimation source substrate on which the organic compound is held in at least one manner selected from the group consisting of the following five manners (A) to (E) so that the organic compound can be deposited on the surface of the molded resin article:

(A) the organic compound being singly applied onto the surface of the sublimation source substrate, or formed into a film on the surface;

(B) the organic compound and a binder resin being applied onto the surface of the sublimation source substrate, or formed into the film on the surface;

(C) a porous particle impregnated with the organic compound being applied onto the surface of the sublimation source substrate, or formed into the film on the surface;

(D) the porous particle impregnated with the organic compound and a binder resin being applied onto the surface of the sublimation source substrate, or formed into the film on the surface; and

(E) a hole in the surface of a porous sublimation source substrate being impregnated with the organic compound.

18. (Canceled)

19. (Previously Presented) The modification apparatus for the resin surface layer according to claim 17 which further contains:

a stirring mechanism for stirring the molded resin article of a powder form.

20. (Previously Presented) The modification apparatus for the resin surface layer according to claim 17 which further contains:

a wind-up mechanism for winding up the molded resin article of a form selected from a textile form, a fiber form and a film form around a reception side reel from a supply side reel under reduced pressure.

21. (Canceled)

22. (Previously Presented) A coloring apparatus for the surface layer of a molded resin article which comprises:

a tightly closable container for placing a dyestuff having sublimation properties and an affinity for a resin of a molded resin article to be colored, and the molded resin article in a saturated sublimation pressure state of the dyestuff;

an exhaust system for adjusting a pressure in the tightly closable container; and

heating means for allowing the dyestuff to penetrate/disperse into the molded resin article, after the dyestuff sublimates and a vapor of the dyestuff is deposited on the surface of the molded resin article; and

a sublimation source substrate on which the dyestuff is held in at least one manner selected from the group consisting of the following five manners (A) to (E) so that the dyestuff can be deposited on the surface of the molded resin article:

(A) the organic compound being singly applied onto the surface of the sublimation source substrate, or formed into a film on the surface;

(B) the organic compound and a binder resin being applied onto the surface of the sublimation source substrate, or formed into a film on the surface;

(C) a porous particle impregnated with the organic compound being applied onto the surface of the sublimation source substrate, or formed into a film on the surface;

(D) the porous particle impregnated with the organic compound and the binder resin being applied onto the surface of the sublimation source substrate, or formed into a film on the surface; and

(E) a hole in the surface of a porous sublimation source substrate being impregnated with the organic compound.

23. (Canceled)

24. (Previously Presented) The coloring apparatus for the resin surface layer according to claim 22 which further contains:

a stirring mechanism for stirring the molded resin article of a powder form.

25. (Previously Presented) The coloring apparatus for the resin surface layer according to claim 22 which further contains:

a wind-up mechanism for winding up the molded resin article of a form selected from a textile form, a fiber form and a film form around a reception side reel from a supply side reel under reduced pressure.

26-39. (Canceled)

40. (Previously Presented) A molded resin article wherein its surface layer is modified with a fluorescent dyestuff having sublimation properties and an affinity for a resin of the molded resin article to be coated, by the modification method of the resin surface layer according to claim 1 to impart a fluorescent light emitting function to the surface layer.

41. (Previously Presented) A molded resin article wherein its surface layer is modified with a photochromic dyestuff having sublimation properties and an affinity for a resin of the molded resin article to be coated, by the modification method of the resin surface layer according to claim 1 to impart a photochromic function to the surface layer.

42. (Previously Presented) A molded resin article wherein its surface layer is modified with an organic metal compound having sublimation properties and an affinity for a resin of the molded resin article to be coated, by the modification method of the resin surface layer according to claim 1 to impart an X ray and/or electron ray and/or ray absorption function to the surface layer.

43. (Previously Presented) A molded resin article wherein its surface layer is modified with an antibacterial or antifungal agent having sublimation properties and an affinity for a resin of the molded resin article to be coated, by the modification method of the resin surface layer according to claim 1 to impart an antibacterial or antifungal function to the surface layer.

44. (Previously Presented) A molded resin article wherein its surface layer is modified with a medicinal activity organic compound having sublimation properties and an affinity for a resin of the molded resin article to be coated, by the modification method of the resin surface layer according to claim 1 to impart a medicinal activity function to the surface layer.

45. (Previously Presented) A molded resin article wherein its surface layer is modified with an organic compound having sublimation properties and an affinity for a resin of the molded resin article to be coated, and assuming a physiological activity to an animal/plant, by the modification method of the resin surface layer according to claim 1 to impart a function as an agricultural chemical to a surface layer.

46. (Previously Presented) The modification method of the resin surface layer according to claim 6 wherein:

the vapor of the organic compound is uniformly deposited on the surface of the molded resin article; and

in order to allow the deposited organic compound to penetrate/disperse for the surface of the molded resin article into its inside,

the temperature of the molded resin article is raised up to a temperature which is equal to or higher than a glass transition temperature of the resin and which does not exceed the thermal decomposition temperature of the organic compound and/or the resin.

47. (Previously Presented) The modification method of the resin surface layer according to claim 7 wherein:

the vapor of the organic compound is uniformly deposited on the surface of the molded resin article; and

in order to allow the deposited organic compound to penetrate/disperse for the surface of the molded resin article into its inside,

the temperature of the molded resin article is raised up to a temperature which is equal to or higher than a glass transition temperature of the resin and which does not exceed the thermal decomposition temperature of the organic compound and/or the resin.

48. (Previously Presented) The modification method of the resin surface layer according to claim 8 wherein:

the vapor of the organic compound is uniformly deposited on the surface of the molded resin article; and

in order to allow the deposited organic compound to penetrate/disperse for the surface of the molded resin article into its inside,

the temperature of the molded resin article is raised up to a temperature which is equal to or higher than a glass transition temperature of the resin and which does not exceed the thermal decomposition temperature of the organic compound and/or the resin.

49. (Previously Presented) The modification method of the resin surface layer according to claim 9 wherein:

the vapor of the organic compound is uniformly deposited on the surface of the molded resin article; and

in order to allow the deposited organic compound to penetrate/disperse for the surface of the molded resin article into its inside,

the temperature of the molded resin article is raised up to a temperature which is equal to or higher than a glass transition temperature of the resin and which does not exceed the thermal decomposition temperature of the organic compound and/or the resin.

50. (Previously Presented) The modification method of the resin surface layer according to claim 10 wherein:

the vapor of the organic compound is uniformly deposited on the surface of the molded resin article; and

in order to allow the deposited organic compound to penetrate/disperse for the surface of the molded resin article into its inside,

the temperature of the molded resin article is raised up to a temperature which is equal to or higher than a glass transition temperature of the resin and which does not exceed the thermal decomposition temperature of the organic compound and/or the resin.

51. (Previously Presented) The modification method of the resin surface layer according to claim 11 wherein:

the vapor of the organic compound is uniformly deposited on the surface of the molded resin article; and

in order to allow the deposited organic compound to penetrate/disperse for the surface of the molded resin article into its inside,

the temperature of the molded resin article is raised up to a temperature which is equal to or higher than a glass transition temperature of the resin and which does not exceed the thermal decomposition temperature of the organic compound and/or the resin.

52. (Previously Presented) The modification method of the resin surface layer according to claim 12 wherein:

the vapor of the organic compound is uniformly deposited on the surface of the molded resin article; and

in order to allow the deposited organic compound to penetrate/disperse for the surface of the molded resin article into its inside,

the temperature of the molded resin article is raised up to a temperature which is equal to or higher than a glass transition temperature of the resin and which does not exceed the thermal decomposition of the organic compound and/or the resin.

53. (Previously Presented) The modification method of the resin surface layer according to claim 46 wherein:

a dyestuff having the sublimation properties and the affinity for the resin of the molded resin article to be coated is used as the organic compound to modify and simultaneously color the surface layer of the molded resin article.

54. (Previously Presented) The modification method of the resin surface layer according to claim 47 wherein:

a dyestuff having the sublimation properties and the affinity for the resin of the molded resin article to be coated is used as the organic compound to modify and simultaneously color the surface layer of the molded resin article.

55. (Previously Presented) The modification method of the resin surface layer according to claim 48 wherein:

a dyestuff having the sublimation properties and the affinity for the resin of the molded resin article to be coated is used as the organic compound to modify and simultaneously color the surface layer of the molded resin article.

56. (Previously Presented) The modification method of the resin surface layer according to claim 49 wherein:

a dyestuff having the sublimation properties and the affinity for the resin of the molded resin article to be coated is used as the organic compound to modify and simultaneously color the surface layer of the molded resin article.

57. (Previously Presented) The modification method of the resin surface layer according to claim 50 wherein:

a dyestuff having the sublimation properties and the affinity for the resin of the molded resin article to be coated is used as the organic compound to modify and simultaneously color the surface layer of the molded resin article.

58. (Previously Presented) The modification method of the resin surface layer according to claim 51 wherein:

a dyestuff having the sublimation properties and the affinity for the resin of the molded resin article to be coated is used as the organic compound to modify and simultaneously color the surface layer of the molded resin article.

59. (Previously Presented) The modification method of the resin surface layer according to claim 52 wherein:

a dyestuff having the sublimation properties and the affinity for the resin of the molded resin article to be coated is used as the organic compound to modify and simultaneously color the surface layer of the molded resin article.

60-63. (Canceled)